

3D Flash LIDAR EDL Resolution Improvement, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



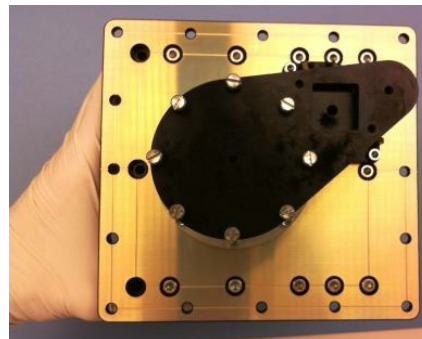
ABSTRACT

Advanced Scientific Concepts, Inc. (ASC) is a small business that has developed 3D Flash LIDAR systems for space and terrestrial applications. 3D Flash LIDAR is ideal for determining real-time spacecraft trajectory, speed and orientation to the planet's surface, as well as evaluating potential landing sites. ASC's Flash LIDAR has been used for autonomous berthing with the International Space Station (ISS) and is currently under development for the OSIRIS-REx asteroid rendezvous mission. Flash LIDAR is also being evaluated by JPL and NASA for Entry Decent and Landing (EDL) for ALHAT and Mars. Through the investigations at JPL and NASA Langley a number of improvements to the technology have been identified as beneficial to landing application. Improved range resolution, spatial resolution, increased sensitivity and greater dynamic range would increase the functionality for successful landing operations. ASC has developed the core technology for Flash LIDAR with its 3D-FPA and is developing higher resolution arrays to address these concerns. ASC currently has on hand high sensitivity 32x32 arrays (shuttle run for the 320x320) that have not been tested with detectors. Initial evaluation suggests that they have increased sensitivity by 50x, spatial resolution by 2.5x, and range resolution by 3x.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: This sensor will increase the success of NASA operations such as: - Mars Landed Exploration - Exploration of Moons (ALHAT, Jupiter Icy Moons) - Asteroid and Comet Rendezvous and Sample Return - ISS Rendezvous and Docking (manned & unmanned) - Space Situational Awareness - Extravehicular Robotic Camera - Rock Abundance and Distribution Maps - Topographical Mapping - Rover Mobility and Navigation NASA Langley Research Center has purchased two of ASC's existing FLVC systems for

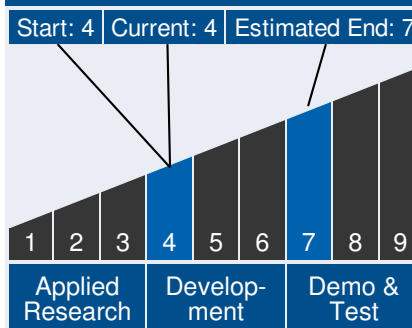


3D Flash LIDAR EDL Resolution Improvement

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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

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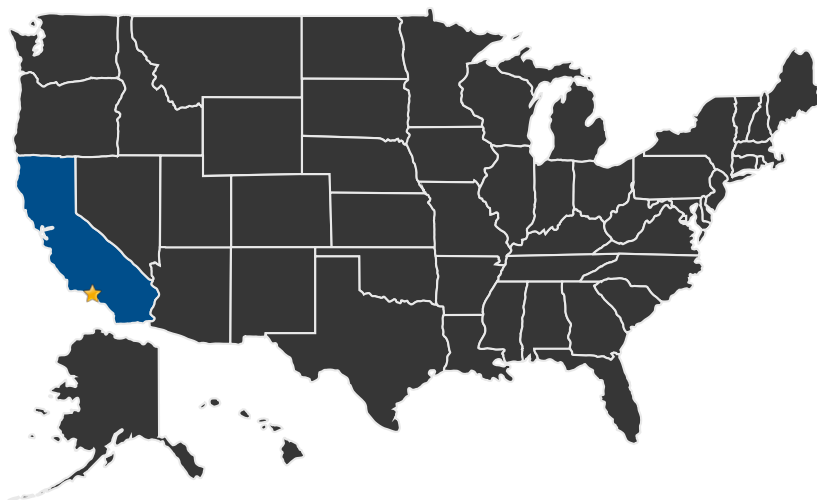


performing laboratory, field, and airborne test and evaluation of this technology for use on the ALHAT program. A FLC been deployed for EDL helicopter and high altitude fixed wing experiments, and has shown excellent results. ASC is continuing to develop and improve its line of 3D Flash LIDAR systems, one of which successfully flew on the Endeavor (STS-127) for AR&D testing.

To the commercial space industry:

Potential Non-NASA Commercial Applications: ASC is pursuing many non-NASA applications. - Collision/Pedestrian Avoidance - Automotive Collision Avoidance - Helicopter landing in Brown-Out Conditions, Mid-Air Refueling - Surveillance - Terrain Mapping - Autonomous Navigation for Unmanned Vehicles - Smart intersection - Robotics and Machine Vision - Underwater 3D Imaging - Sub Nanosecond Dynamic Imaging - 3D Sports Imaging

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ Lead Center:
Jet Propulsion Laboratory

Management Team (cont.)

Program Manager:

- Carlos Torrez

Project Manager:

- Robert Jones

Principal Investigator:

- Brad Short

Technology Areas

Primary Technology Area:

Robotics and Autonomous Systems (TA 4)

- └ Sensing and Perception (TA 4.1)
 - └ 3D Sensing (TA 4.1.1)
 - └ Three-Dimensional (3D) Range Imaging Sensors for Surface Mobility (TA 4.1.1.1)

Communications, Navigation, and Orbital Debris Tracking and Characterization Systems (TA 5)

- └ Position, Navigation, and Timing (TA 5.4)
 - └ Relative and Proximity Navigation (TA 5.4.4)
 - └ Flash Light Detection and Ranging (LIDAR), Scanning LIDARs (TA 5.4.4.3)

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Other Organizations Performing Work:

- Advanced Scientific Concepts, Inc. (Santa Barbara, CA)

Technology Areas (cont.)

Entry, Descent, and Landing Systems (TA 9)

└ Descent and Targeting (TA 9.2)

└ Terrain-Relative Sensing and Characterization (TA 9.2.7)

└ Advanced Sensors for Real-Time Three-Dimensional (3D) Terrain Mapping (TA 9.2.7.2)

└ Vehicle Systems (TA 9.4)

└ GN&C Sensors and Systems (TA 9.4.7)

DETAILS FOR TECHNOLOGY 1

Technology Title

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